Estimation of Dense Nonaqueous Phase Liquid (DNAPL) volume from monitoring wells fluid levels

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Abstract: The volume of a dense nonaqueous phase liquid (DNAPL) in a homogeneous porous medium is estimated based on its thickness in a monitoring well. This method is an extension of the method proposed simultaneously by Farr et al. (1990) and Lenhard and Parker (1990) to estimate the volume of light nonaqueous phase liquids (LNAPLs) in porous media. This method assumes a static distribution of the two fluids and negligible DNAPL residual saturation. The results of this study show that no matter how thick the DNAPL body is, it coexists with the residual water and that any continuous DNAPL body will appear in a monitoring well since it will be at positive pressure. The Brooks-Corey relation between the saturation and the capillary pressure predicts the level of the DNAPL in the monitoring well to be above the level of continuous DNAPL in the porous medium. The predictions based on this method agree well with published experimental results made on DNAPLs in various porous media. Finally a method is suggested to test whether a given porous media is best described by the Brooks-Corey or the van Genuchten capillary pressure-saturation relation.